Remarks

In the Office Action, the disclosure was objected to because of informalities, it being asserted that, on page 5, the third, fourth, and eighth compounds of Ch and N have the same structural formulas. Also, claims 12 and 27 were rejected under 35 U.S.C. §112, second paragraph, it being similarly asserted that the third, fourth, and eighth compounds of Ch and N have the same structural formulas.

After carefully reviewing the structures in question, the applicants respectfully disagree with these assertions. The fourth compound has a chloro substituent in each of the *Ch* and *N* groups, a substituent that is lacking in the *Ch* and *N* groups of the third compound. Also, in each of the third and fourth compounds, the *Ch* and *N* groups are structurally identical to one another, except that the *Ch* moiety is chiral and therefore optically active, while the *N* moiety is racemic and therefore optically inactive. With regard to the eighth compound, its *Ch* and *N* groups include, respectively, a biphenyl moiety and a naphthylacetylenic moiety, neither of which is included in the *Ch* and *N* groups of the third and fourth compounds. Withdrawal of the objection to the specification and the §112 rejection of claims 12 and 27 is therefore respectfully requested.

The present invention is directed to glassy chiral-nematic liquid crystal compositions and optical devices containing them. It is well known in the art that the phrase "chiral-nematic" is synonymous with "cholesteric." For example, Bach et al., U.S. Patent No. 5,417,882, ("Bach"), states that "The structure of the cholesteric phase, which can only be achieved with optically active molecules, is closely related to that of the nematic phase. It is therefore frequently also known as the chiral nematic phase." (column 3, lines 14-17).

Claims 1 and 17 are currently amended to recite that the glassy chiral-nematic liquid crystal composition is characterized by a morphologically stable cholesteric phase. These amendments, which make clear that the chiral-nematic phase corresponds to the morphologically stable cholesteric phase, are supported by FIGS. 2, 5, and 7 as described at page 3, line 27, to page 4, line 11 of the instant specification, and further by page 20, lines 1-4 and 26-28, of the specification.

Claims 1-2, 7, 10, 17-18, 23, 26, (27), 32-33 and 35 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Delavier et al., U.S. Patent No. 5,804,097 ("Delavier"). Claims 3-6,8-9, 11, 13-16, 19-22, 24-25, 28-31 and 34 have

been objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form, including all of the limitations of the base claim and any intervening claims.

Delavier discloses liquid crystalline compounds of the formula I that can, depending on the structure, form smectic, nematic or cholesteric phases (column 5, lines 23-25). For their intended use in ferroelectric displays, these materials would desirably exhibit phase behavior in which the sequence on cooling passes from nematic to smectic A to smectic C; an object of the invention is to provide liquid crystalline compounds that solidify in a glass-like manner and have nematic and smectic phases (column 1, lines 36-39 and 45-47).

Bach, which is the sole U.S. patent reference cited in Delavier, discusses nematic, cholesteric (chiral nematic), and the various smectic liquid crystalline phases, and the use of the chiral S_c phase for ferroelectric displays (column 3, lines 1-57).

In the Office Action, it was acknowledged that compounds of the formula of the instant application, wherein a 1,3, 5-benzenetricarbonyl central moiety is connected by carboxylic ester linkages to one chiral (*Ch*) group and two nematic (*N*) groups, are not exemplified in Delavier. It was noted that Examples 2-8 and Examples 24-25 of the reference have a 1,3, 5-benzenetricarbonyl core substituted with, respectively, nematic and chiral groups, and further that Examples 82, 84, and 86, all mixtures of five compounds, each has a nematic/chiral ratio of 2/1. It was asserted that these mixtures render obvious the glassy chiral-nematic liquid crystal compositions of the present invention, wherein the 1,3, 5-benzenetricarbonyl central moiety is connected by carboxylic ester linkages to two nematic (*N*) groups and one chiral (*Ch*) group. The applicants respectfully disagree with this assertion, for reasons that will be evident from the discussion that follows.

Exemplary liquid crystalline materials of Delavier in the isotropic I phase invariably proceed upon cooling to a smectic S phase, occasionally passing through a nematic N phase. Examples 82, 84, and 86, to which attention was drawn in the Office Action, all pass from an I phase directly to an S_c phase. Of the 92 examples of the reference, only Examples 21, 61, and 62, each with three chiral groups attached to a 1,3, 5-benzenetricarbonyl core, proceed through a cholesteric Ch phase enroute to a smectic S phase. In each instance, the temperature range in which these symmetrical chirally substituted compounds are in a cholesteric Ch phase prior to passing into a

smectic S phase is very short: 5° for Example 21, 12° for Example 61, and 7° for Example 62. Contrast these results with those for compounds I-R, I-S, II-S, and III-S of the present invention, which, as shown in FIGS. 2, 5, and 7, remain in the cholesteric phase over a broad temperature range and revert to the glassy G state on cooling, without formation of a smectic S phase.

Thus, the disclosure of Delavier clearly fails to render obvious the glassy chiral-nematic liquid crystal compositions of the present invention. Withdrawal of the §103(a) rejection of claims 1-2, 7, 10, 17-18, 23, 26, (27), 32-33 and 35 is respectfully requested.

Claims 1-35 remain in this case, whose prompt allowance is earnestly solicited.

Respectfully submitted,

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